



TEST REPORT

Reference No. : WTX24D11274664W002
Manufacturer* : Lumi United Technology Co., Ltd
Address : B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, Guangdong 518000, China
Factory : Lumi United Technology Co., Ltd
Address : B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, Guangdong 518000, China
Product : Hub M100
Model(s) : HM-G02E, HM-G02D
Brand Name : Aqara
Standards : ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-17 V3.3.1 (2024-09)
Date of Receipt sample : 2024-11-27
Date of Test : 2024-12-04 to 2024-12-19
Date of Issue : 2024-12-26
Test Result : Pass

Remarks:

1. The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.
2. **“** manufacturer** means any natural or legal person who manufactures radio equipment or has radio equipment designed or manufactured, and markets that equipment under his name or trade mark.

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3 Revision History

Test Report No.	Date of Receipt Sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTX24D11274664W002	2024-11-27	2024-12-04 to 2024-12-19	2024-12-26	Original	-	Valid

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4 General Information

4.1 General Description of E.U.T.

Product: Hub M100
Model(s): HM-G02E, HM-G02D
Model Description: Only the model number and sale channels are different.
The model HM-G02E was tested in this report.

4.2 Details of E.U.T.

Ratings: Input: 5V---0.5A

4.3 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

Yes No

If Yes, list the related test items and lab information:

Test Lab: /

Lab address: /

Test items: /

4.4 Abnormalities from Standard Conditions

None.



5 Test Summary

EMC PART		
Test Items	Test Requirement	Result
Conducted Emissions	EN 301 489-1/17	PASS
Radiated Emissions	EN 301 489-1/17	PASS
Harmonic Current Emissions	EN 301 489-1/17	N/A
Voltage Fluctuations and Flicker	EN 301 489-1/17	N/A
Electrostatic Discharge(ESD)	EN 301 489-1/17	PASS
Radiated Immunity (R/S)	EN 301 489-1/17	PASS
Electrical Fast Transients (EFT)	EN 301 489-1/17	PASS
Surge Immunity	EN 301 489-1/17	PASS
Conducted Immunity (C/S)	EN 301 489-1/17	PASS
Voltage Dips and Interruptions	EN 301 489-1/17	PASS
Remark: PASS: Test item meets the requirement N/A: Not Applicable		



6 Equipment Used during Test

6.1 Equipments List

Conducted Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMI Test Receiver	R&S	ESCI	100947	2024-07-18	2025-07-17
2	LISN	R&S	ENV216	100115	2024-07-18	2025-07-17
3	Cable	Top	TYPE16(3.5M)	-	2024-07-18	2025-07-17
3m Semi-anechoic Chamber for Radiation (TDK)						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2024-04-22	2025-04-21
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2024-11-04	2025-11-03
3	Amplifier	ANRITSU	MH648A	M43381	2024-04-22	2025-04-21
4	Cable	HUBER+SUHNE R	CBL2	525178	2024-04-22	2025-04-21
3m Semi-anechoic Chamber for Radiation Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP30	100091	2024-04-22	2025-04-21
2	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2024-01-23	2025-01-22
3	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2024-07-18	2025-07-17
4	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	2024-04-22	2025-04-21
Electrostatic Discharge						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Electrostatic Discharge Simulator	SCHLODER	SESD 216	606144	2024-04-24	2025-04-23
Radio-frequency electromagnetic fields						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Signal Generator	R&S	SMB100A	105942	2024-07-18	2025-07-17
2	RF Power Amplifier	BONN Elektronik	BLWA0830-160/100/40D	128740	2024-07-18	2025-07-17
3	Gestockte Breitband (S tacked) Log.-per.Antenna	SCHWARZBECK	STLP9128D	043	2024-07-18	2025-07-17
4	Power Meter	R&S	NRP2	102031	2024-07-18	2025-07-17
5	Amplifier	NJNT	NTWPAS-2560025	2560025	2024-07-18	2025-07-17
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2024-01-23	2025-01-22



7	Microphone tuned amplifier	B&K	B&K 2690-A	NA	2024-07-31	2025-07-30
8	Universal Radio Communication Tester	R&S	CMW 500	127818	2024-04-22	2025-04-21

Surge, EFT, Voltage dips and Interruption

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	All Modules Generator	SCHAFFNER	6150	34579	2024-07-18	2025-07-17
2	Capacitive Coupling Clamp	SCHAFFNER	CDN 8014	25311	2024-07-18	2025-07-17
3	Signal and Data Line Coupling Network	SCHAFFNER	CDN 117	25627	2024-07-18	2025-07-17
4	AC Power Supply	HENGYUAN	DTDGC-4	-	2024-07-18	2025-07-17

Conducted Immunity

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	RF Generator	TESEQ	NSG4070	25781	2024-07-18	2025-07-17
2	CDN M-Type	TESEQ	CDN M016	25112	2024-01-16	2025-01-15
3	EM-Clamp	TESEQ	KEMZ 801	25453	2024-07-18	2025-07-17
4	Attenuator 6dB	TESEQ	ATN6050	25376	2024-07-18	2025-07-17
5	Universal Radio Communication Tester	R&S	CMW 500	127818	2024-04-22	2025-04-21

Test Software:

Test Item	Software name	Software version
Conduction disturbance Radiated Emission(3m)	EZ-EMC	EZ-EMC(RA-03A1-1)
Electrical Fast Transients Surges Voltage Dips and Voltage interruptions	Schaffner System	Modula 2.7
Radiation Immunity	BL	BL410-E V19.614
Injected Currents	BL	BL410-E V19.614

6.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
/	/	/	/

6.3 Measurement Uncertainty

Parameter	Uncertainty
Conduction disturbance(150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±4.53dB
Radiated Emission(1GHz~6GHz)	±5.03dB



6.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

6.5 Test Modes

Conducted Emissions	
TM1*	Wi-Fi communication
TM2	BLE communication
TM3	Zigbee communication
Radiated Emissions	
TM1*	Wi-Fi communication
TM2	BLE communication
TM3	Zigbee communication
Electrostatic Discharge (ESD)	
TM1*	Wi-Fi communication
TM2	BLE communication
TM3	Zigbee communication
Radiated Immunity(R/S)	
TM1*	Wi-Fi communication
TM2	BLE communication
TM3	Zigbee communication
Electrical Fast Transients (EFT)/ Surge Immunity/ Voltage Dips and Interruptions/Conducted Immunity(C/S)	
TM1*	Wi-Fi communication
TM2	BLE communication
TM3	Zigbee communication
All test mode were tested and passed, only Conducted Emissions, Radiated Emissions Voltage Fluctuations and Flicker shows the worst-case mode which were recorded in this report.	



7 EMC Requirements for Emissions

7.1 Conducted Emissions from the AC mains power ports

Test Method	:	EN 301 489-1, EN 55032
Frequency Range	:	150kHz to 30MHz
Class/Severity	:	Class B/ Table A.10 of EN 55032
Detector	:	Peak for pre-scan (9kHz Resolution Bandwidth)

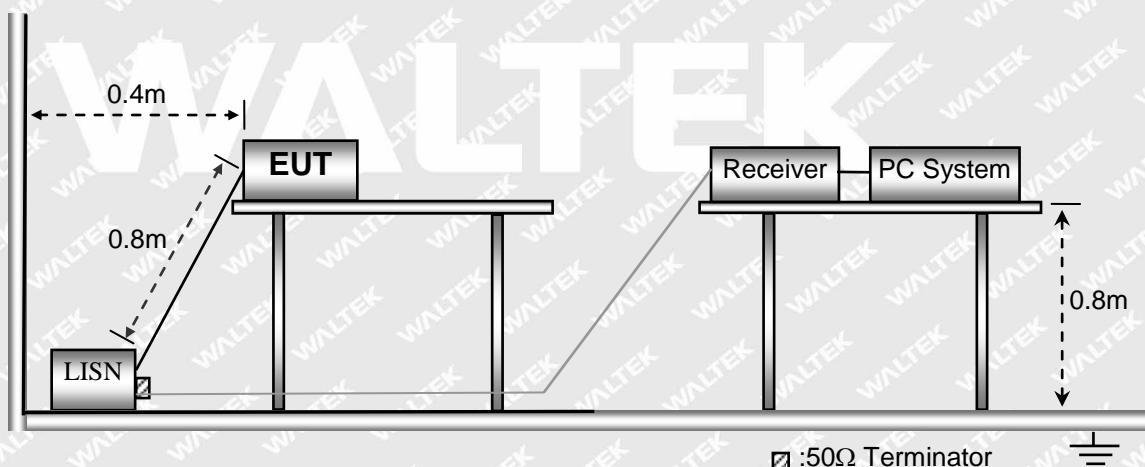
7.1.1 E.U.T. Operation

Operating Environment:

Temperature	:	26.1 °C
Humidity	:	50.5 % RH
Atmospheric Pressure	:	101.3kPa
EUT Operation	:	Refer to section 6.5.

7.1.2 Test Setup

The conducted emission tests were performed using the setup accordance with the EN 55032.



7.1.3 Measurement Description

An initial pre-scan was performed on the live and neutral lines.

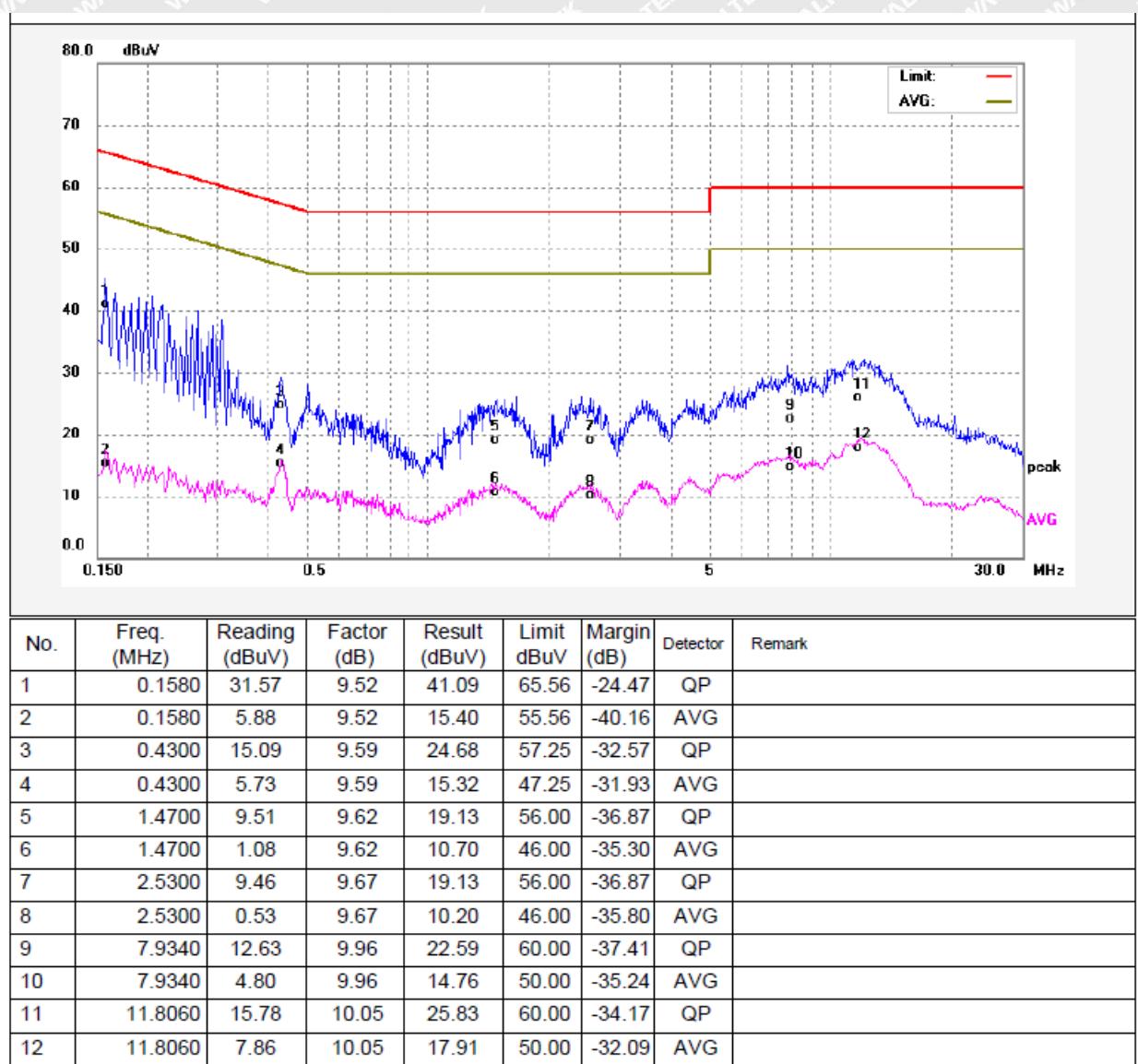
No further quasi-peak or average measurements were performed since no peak emissions were detected within 10dB line below the average limit.

Please refer to the following peak scan graph for reference.



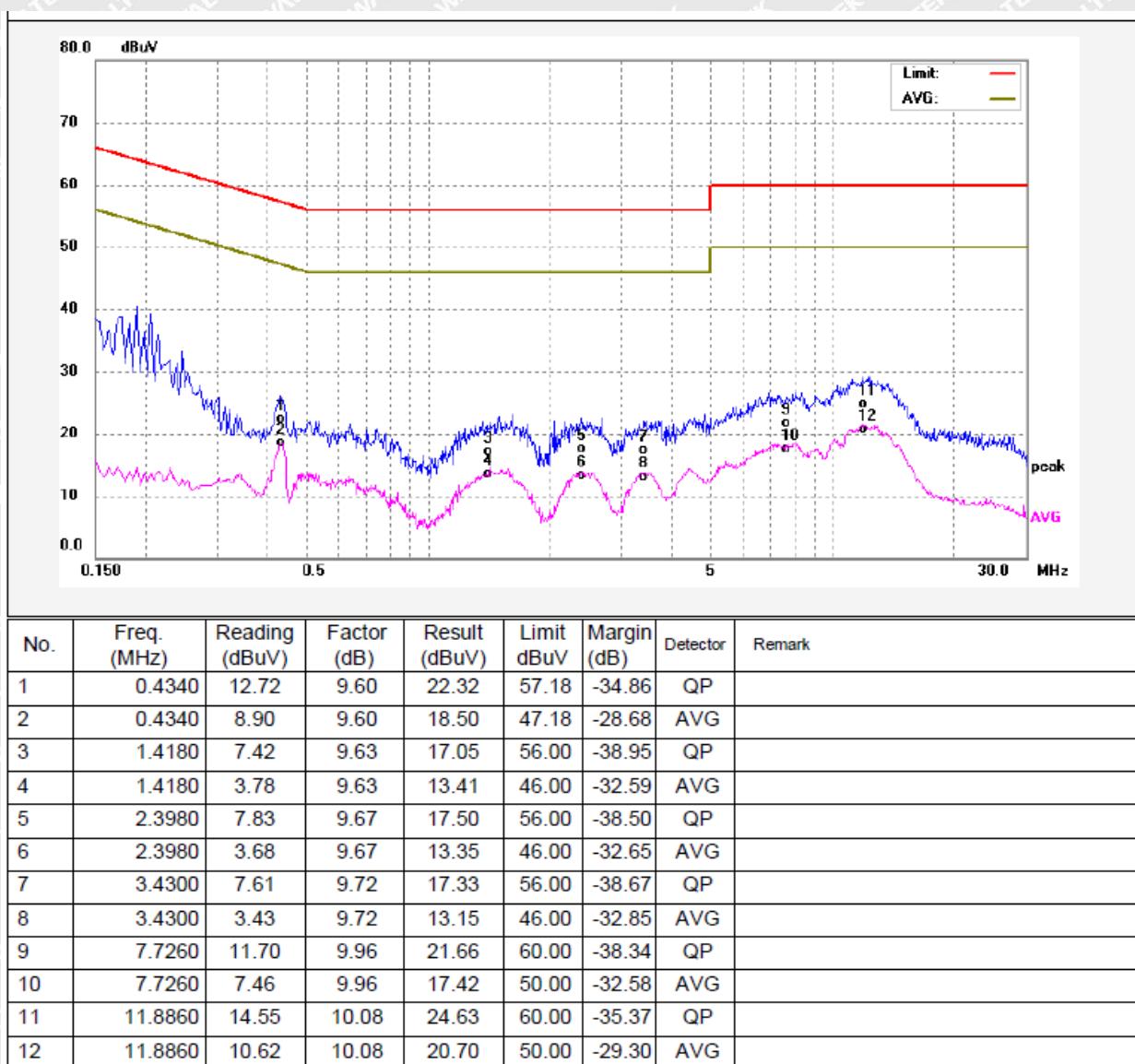
7.1.4 Test Results

Live Line:





Neutral Line:



7.2 Radiated Emissions

Test Method	: EN 301 489-1, EN 55032
Frequency Range	: 30MHz to 1GHz, 1GHz to 6GHz
Class/Severity	: Class B/ Table A.4 of EN 55032 (30MHz to 1GHz)
Detector	: Peak for pre-scan (120kHz Resolution Bandwidth Below 1GHz; 1MHz Resolution Bandwidth Above 1GHz)

7.2.1 EUT Operation:

Operating Environment:

Temperature	: 24.7°C
Humidity	: 46.5% RH
Atmospheric Pressure	: 101.2kPa
EUT Operation	: Refer to section 6.5.

7.2.2 Test Setup

The radiated emission tests were performed using the setup accordance with the EN 55032.

Frequency Range: Below 1 GHz

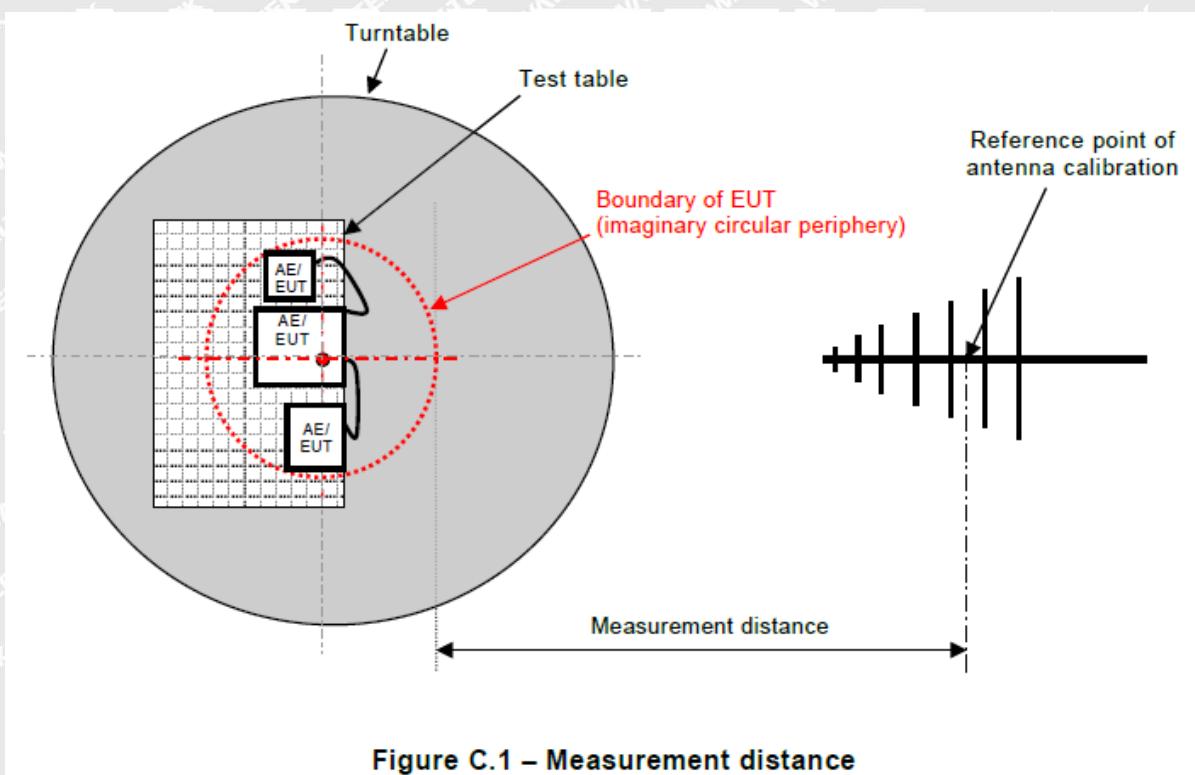
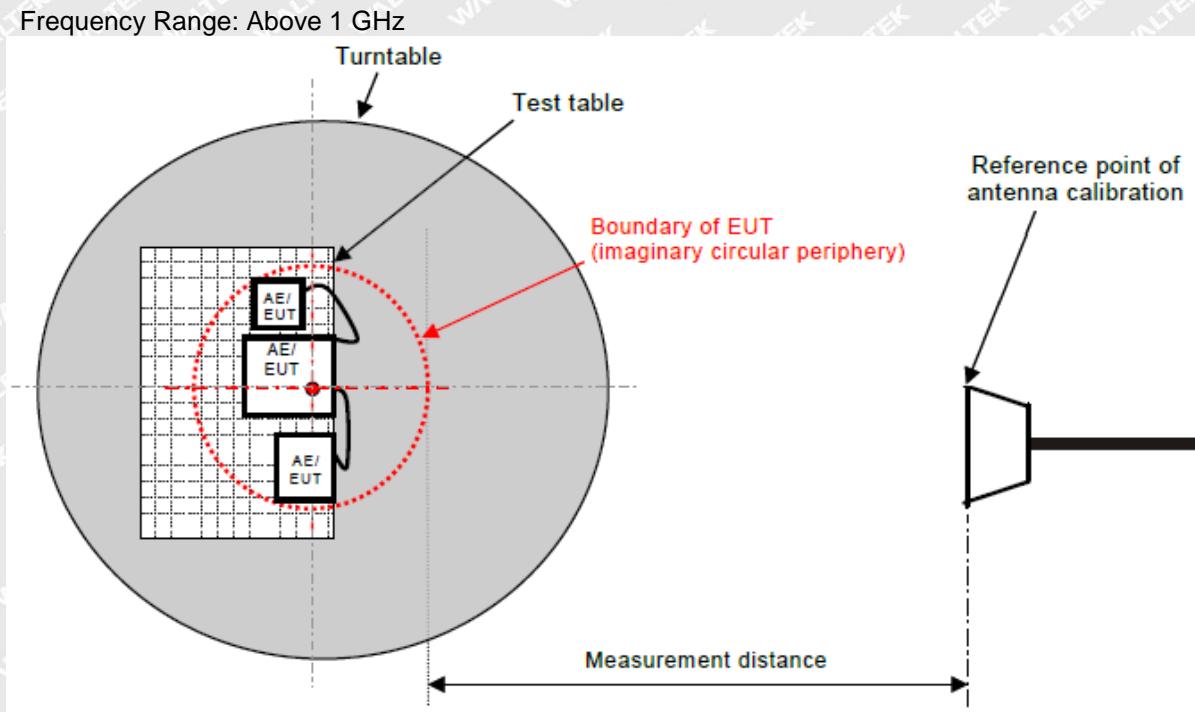


Figure C.1 – Measurement distance



7.2.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

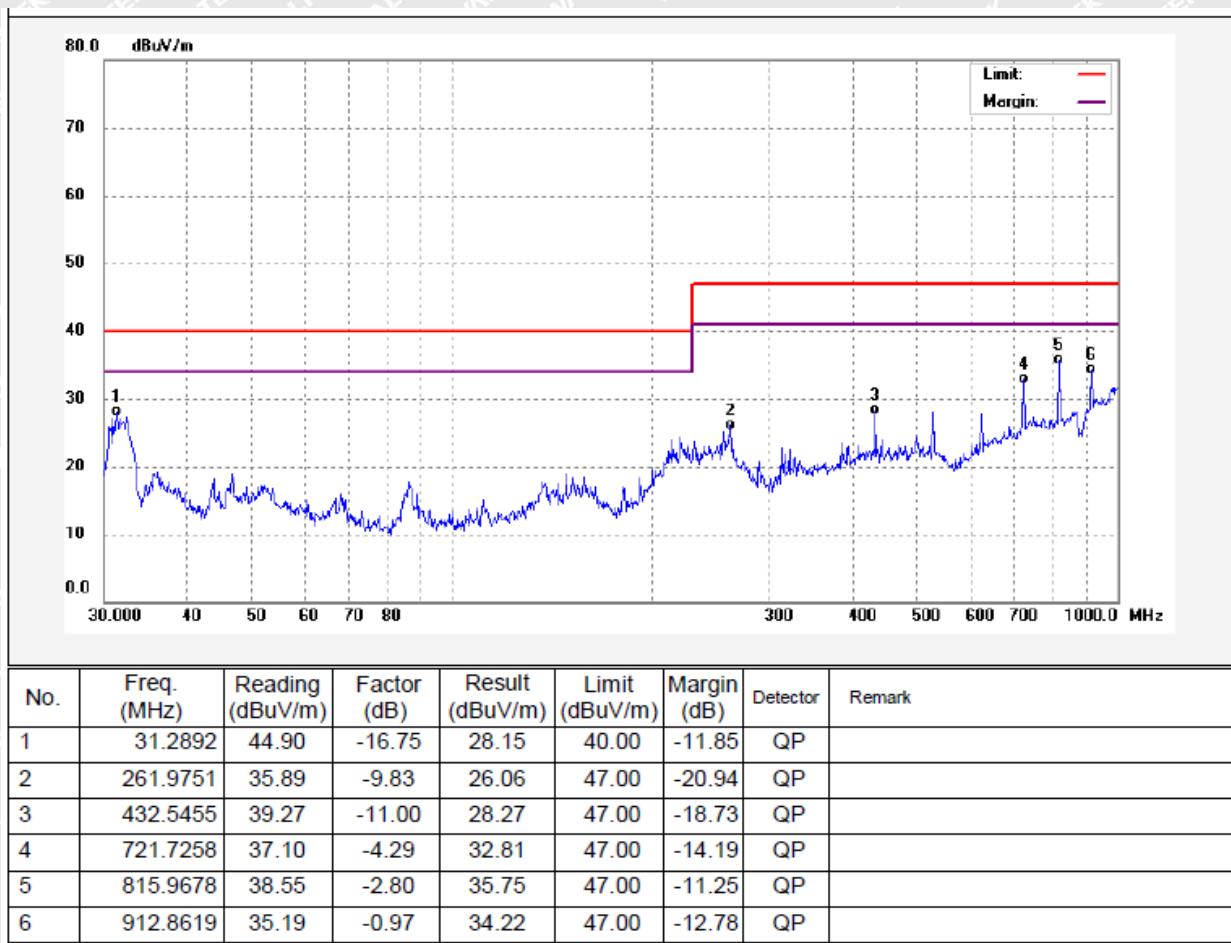
$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$



7.2.4 Test Result

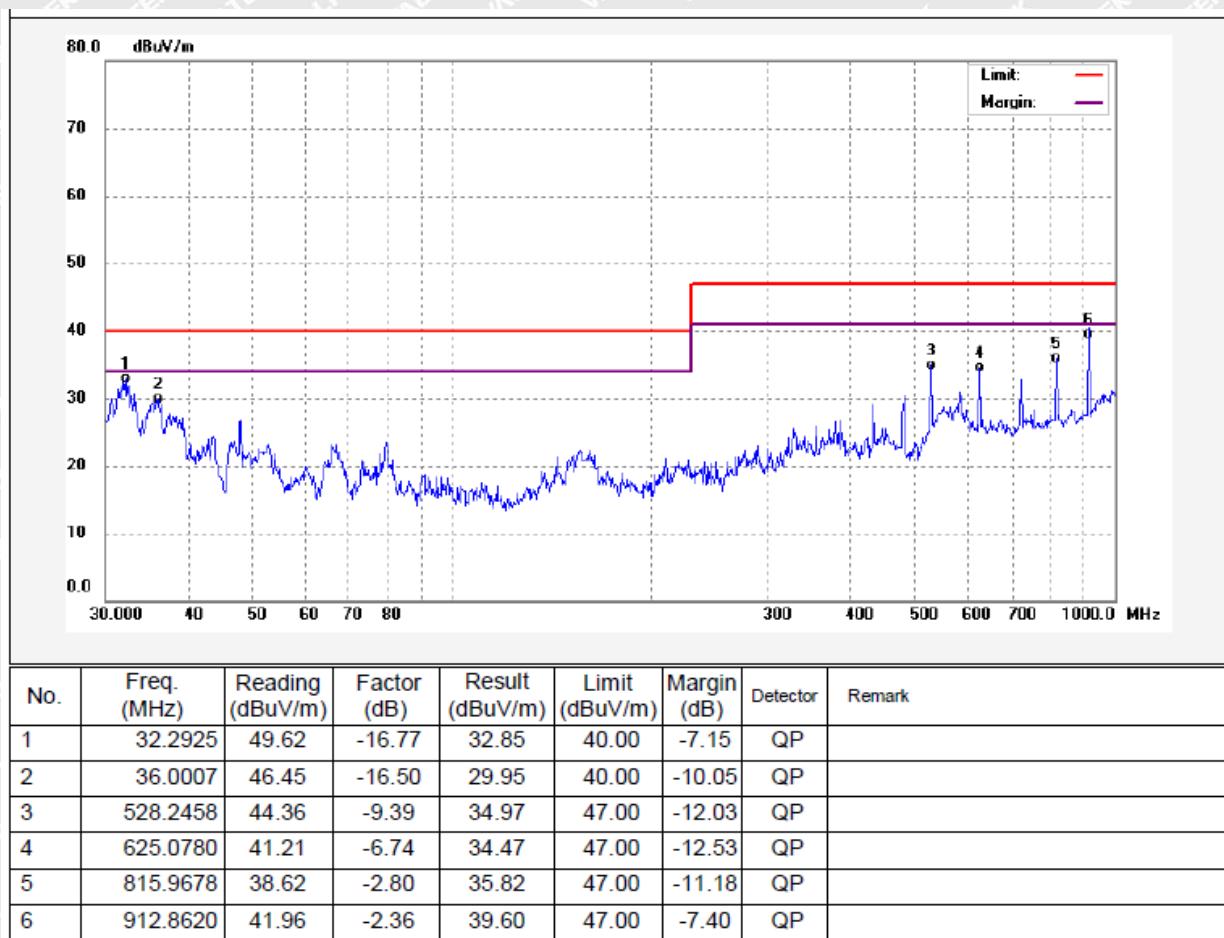
Frequency Range: 30MHz ~ 1000MHz

Antenna Polarization: Horizontal



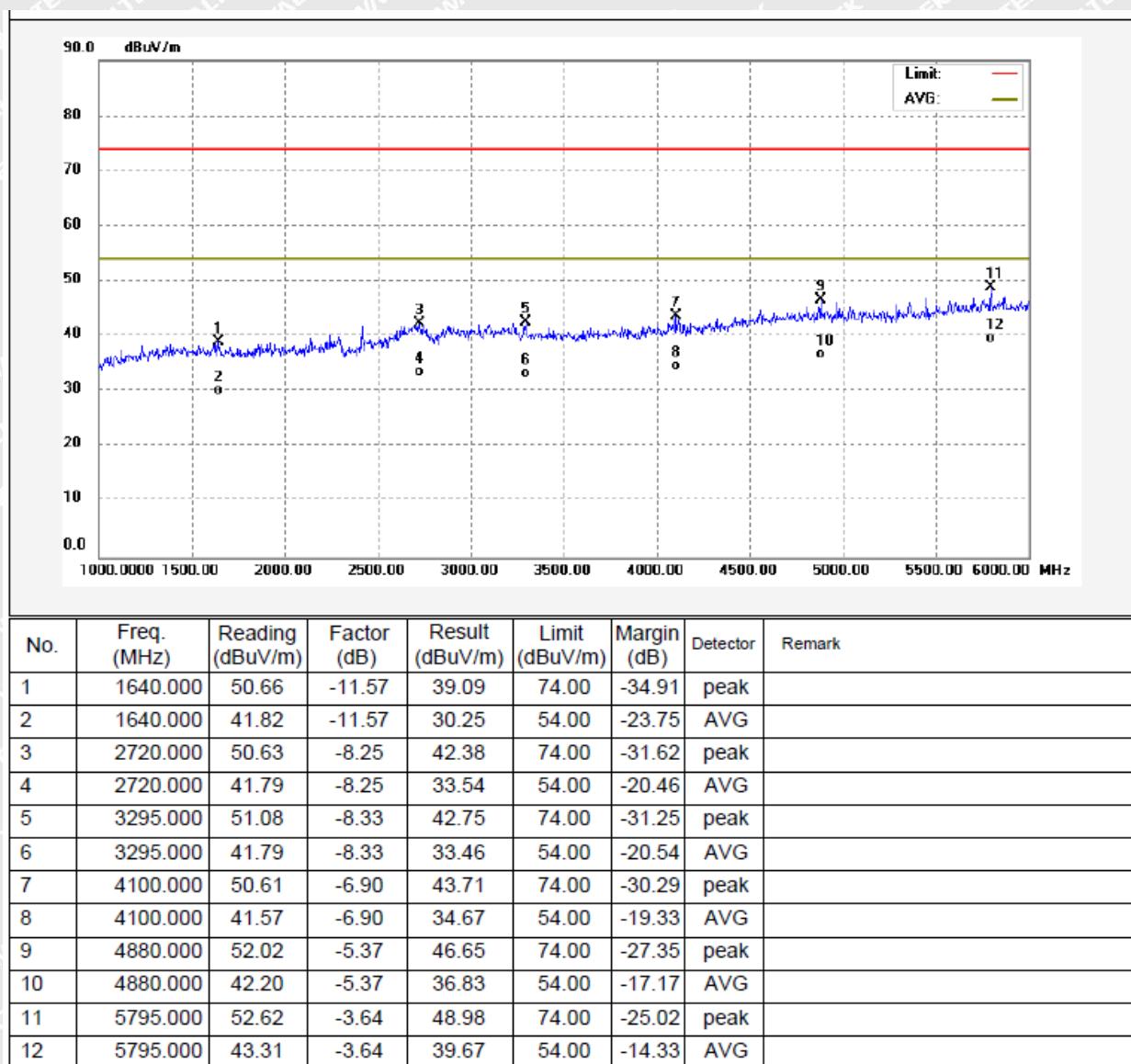


Antenna Polarization: Vertical



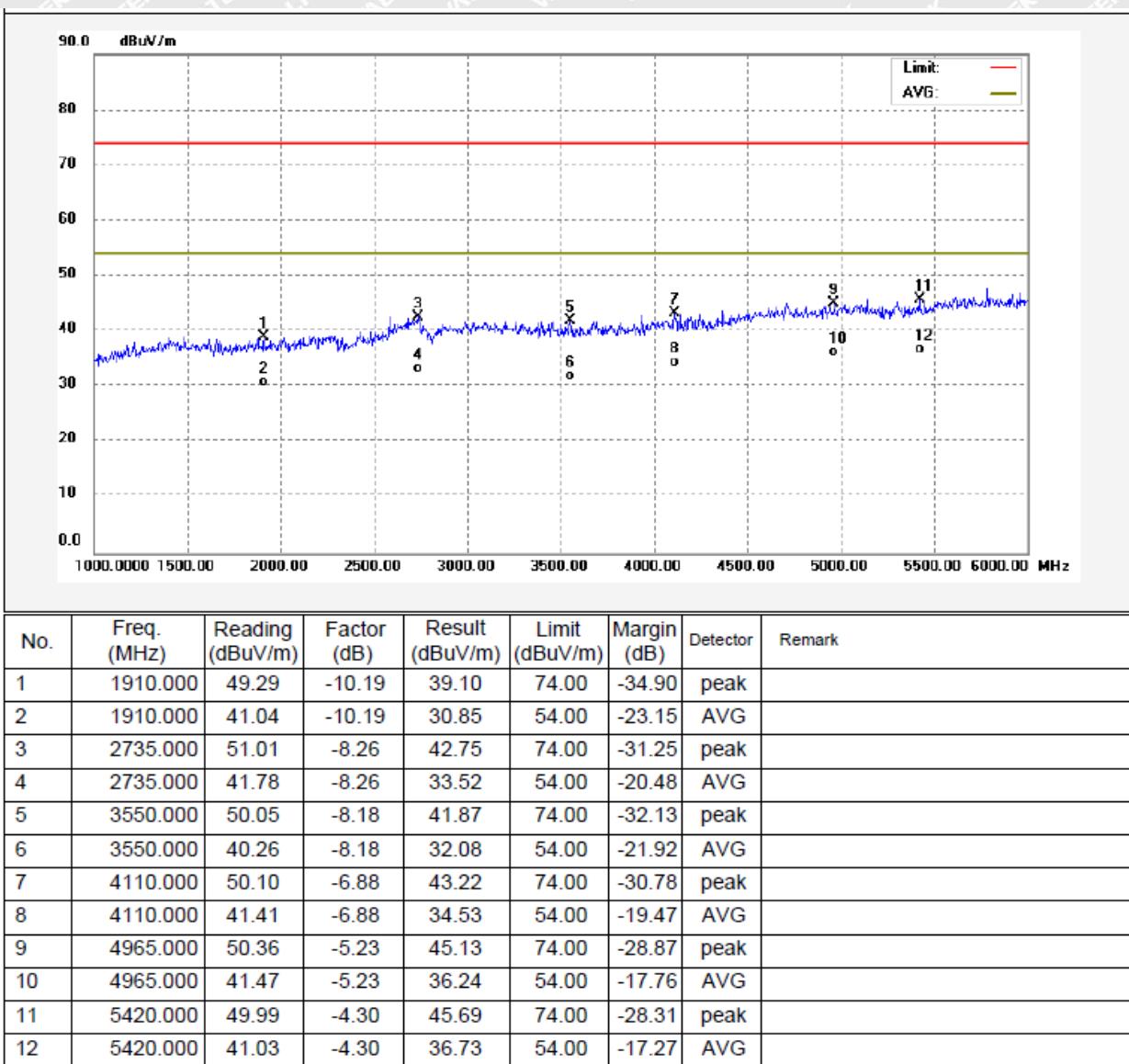
**Frequency Range: 1000MHz ~ 6000MHz**

Antenna Polarization: Horizontal





Antenna Polarization: Vertical





8 EMC Requirement for Immunity

8.1 Performance Criteria Description

ETSI EN 301 489-1 V2.2.3 Clause 6 requirements:

The performance criteria are used to take a decision on whether a radio equipment passes or fails immunity tests.

For the purpose of the present document four categories of performance criteria apply:

- Performance criteria for continuous phenomena applied to transmitters and receivers
- Performance criteria for transient phenomena applied to transmitters and receivers

Performance criteria for continuous phenomena

During the test, the equipment shall:

- continue to operate as intended;
- not unintentionally transmit;
- not unintentionally change its operating state;
- not unintentionally change critical stored data.

Performance criteria for transient phenomena

For all ports and transient phenomena with the exception described below, the following applies:

- The application of the transient phenomena shall not result in a change of the mode of operation (e.g. unintended transmission) or the loss of critical stored data.
- After application of the transient phenomena, the equipment shall operate as intended.

For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:

- For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.
- For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.



ETSI EN 301 489-17 V3.3.1 Clause 6 requirements:

The performance criteria are:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

Performance criteria

Criteria	During test	After test
A	Shall operate as intended. (see note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of stored data.
B	May show loss of function	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
NOTE: Operate as intended during the test shall be considered as:		<ul style="list-style-type: none"> • For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %. • For equipment that does not support a PER or a FER, (e.g. audio equipment and equipment transmitting sporadic messages) the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.

Performance criteria for Continuous phenomena

The performance criteria A shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test.

Performance criteria for Transient phenomena

The performance criteria B shall apply for transient phenomena, except for voltage dips greater than or equal to 100 ms, voltage interruptions of 5 000 ms duration, and surges of 10/700 μ s for which performance criteria C shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as result of the application of the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as result of the application of the test.

8.2 Electrostatic Discharge(ESD)

Test Method	:	EN 301 489-1, EN 61000-4-2
Discharge Impedance	:	330 Ω / 150 pF
Discharge Voltage	:	Air Discharge: +/-2,4,8 KV Contact Discharge: +/-2,4 KV HCP & VCP: +/-2,4 KV
Polarity	:	Positive & Negative
Discharge Repeat Times	:	At Least 20 times at each test point
Discharge Mode	:	Single Discharge
Discharge Period	:	1 second minimum

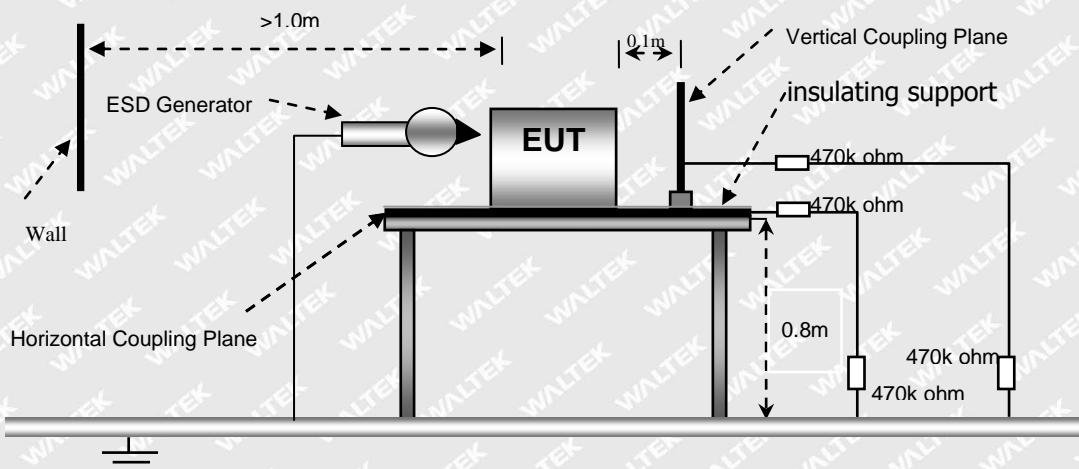
8.2.1 E.U.T. Operation

Operating Environment:

Temperature	:	24.2°C
Humidity	:	47.2 % RH
Barometric Pressure	:	102.4kPa
EUT Operation	:	Refer to section 6.5.

8.2.2 Block Diagram of Setup

The ESD test was performed in accordance with the EN 61000-4-2.





8.2.3 Test Results

Indirect Application			Performance Criteria	
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling	Vertical Coupling
2,4	+/-	1	B	B
Remark:				
Test points: 1. All sides(Front/Top/ Back/ Left/Right Sides).				

Direct Application			Performance Criteria	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
2,4,8	+/-	1	/	B
2,4	+/-	2	B	/
Remark:				
Test points: 1. All Exposed Surface & Seams; 2. All metallic part				
N/A: Not applicable.				

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8.3 Radiated Immunity(R/S)

Test Method	: EN 301 489-1, EN 61000-4-3
Face Under Test	: Three Mutually Orthogonal Faces
Severity	: 3V/m, 1kHz, 80% Amp. Mod.; 3V/m, 200Hz, 100% Amp. Mod.; CW;
Test Result	: PASS

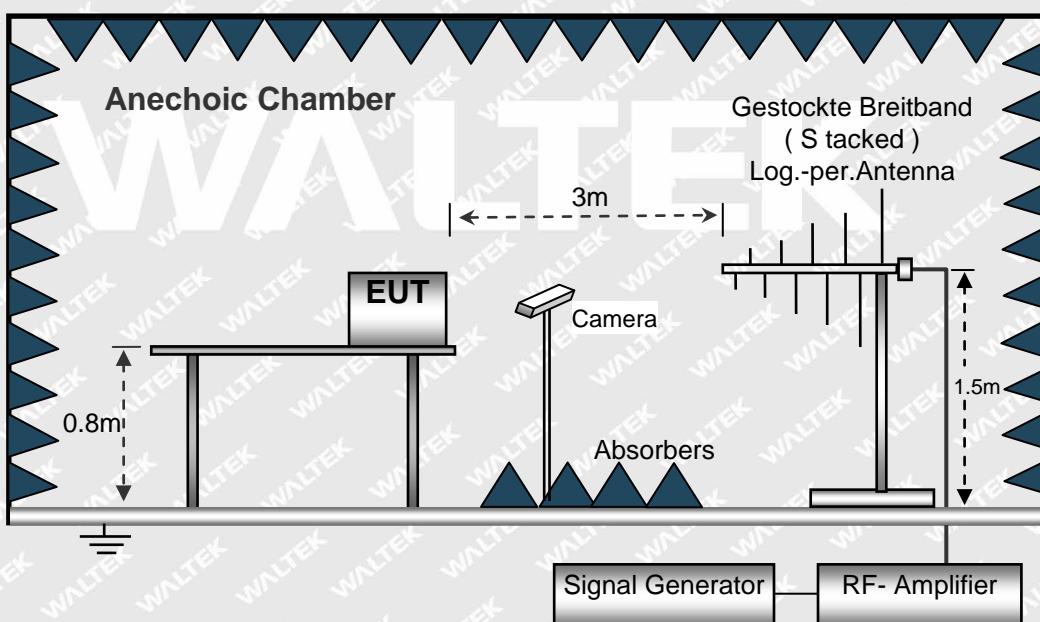
8.3.1 E.U.T. Operation

Operating Environment:

Temperature	: 24.6°C
Humidity	: 46.1 % RH
Barometric Pressure	: 102.0kPa
EUT Operation	: Refer to section 6.5.

8.3.2 Block Diagram of Setup

The Radiated Immunity test was performed in accordance with the EN 61000-4-3.



8.3.3 Test Results

Frequency	Level	Modulation	EUT Face	Performance Criteria	PER
80MHz -3GHz,	3V/m	1kHz, 80%, Amp. Mod.	Front, Back Left, Right	A	0.000%
3GHz - 6GHz	3V/m	1kHz, 80%, Amp. Mod.	Front, Back Left, Right	A	0.000%

8.4 Electrical Fast Transients (EFT)

Test Method	: EN 301 489-1, EN 61000-4-4
Polarity	: Positive & Negative
Repetition Frequency	: 5kHz
Burst Duration	: 300ms
Test Duration	: 2 minutes per level & polarity

8.4.1 E.U.T. Operation

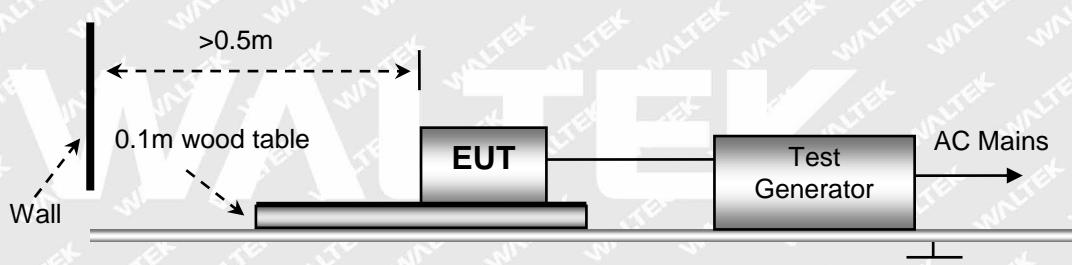
Operating Environment:

Temperature	: 24.2°C
Humidity	: 47.2% RH
Barometric Pressure	: 102.4kPa
EUT Operation	: Refer to section 6.5.

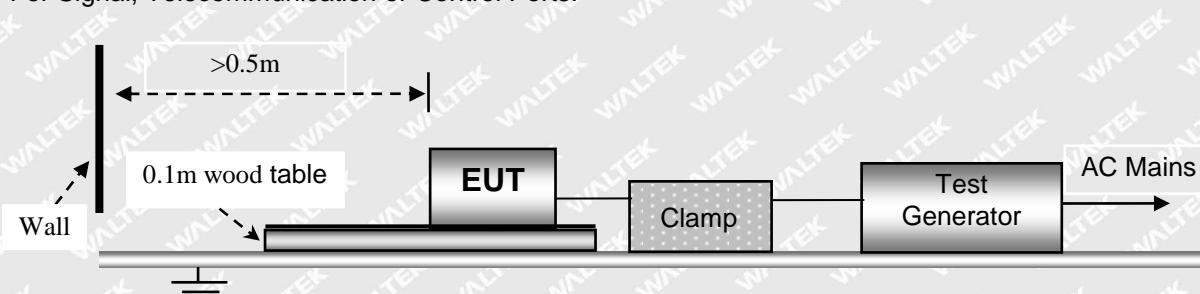
8.4.2 Block Diagram of Test Setup

The Electrical Fast Transients Immunity test was performed in accordance with the EN 61000-4-4.

For AC Mains or DC Ports:



For Signal, Telecommunication or Control Ports:



8.4.3 Test Results

Lead under Test	Test Level	Test Voltage	Performance Criteria
AC Mains	2	±1.0 kV	B



8.5 Surges

Test Method	: EN 301 489-1, EN 61000-4-5
Interval	: 60s between each surge
No. of surges	: 5positive, 5negative at 0°, 90°, 180°, 270°.

8.5.1 E.U.T. Operation

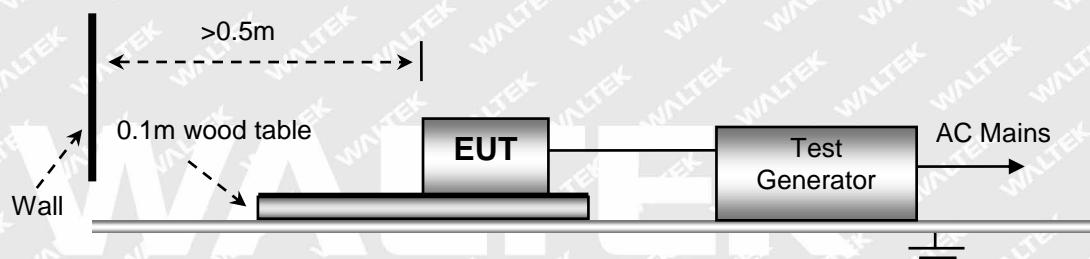
Operating Environment:

Temperature	: 25.8°C
Humidity	: 55.7 % RH
Barometric Pressure	: 101.8kPa
EUT Operation	: Refer to section 6.5.

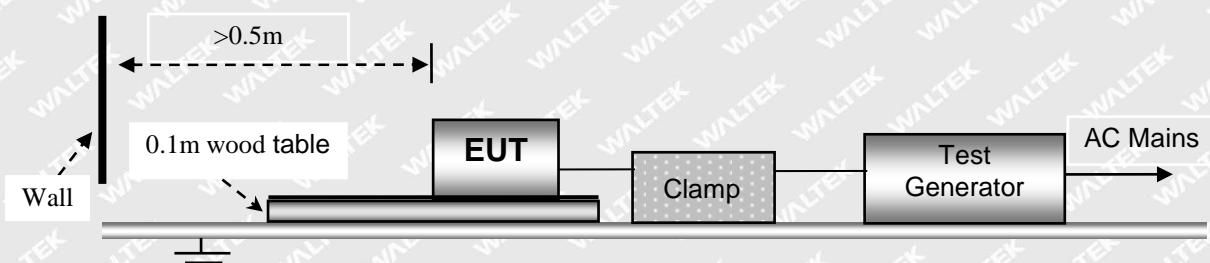
8.5.2 Block Diagram of Test Setup

The Surges Immunity test was performed in accordance with the EN 61000-4-5.

For AC Mains or DC Ports:



For Telecommunication Port:



8.5.3 Test Results

Lead under Test	Test Level	Test Voltage	Path	Performance Criteria
AC Mains	2	±1kV	Line to line	B
	2	±2kV	Line to ground	B



8.6 Conducted Immunity 0.15MHz to 80MHz

Test Method : EN 301 489-1, EN 61000-4-6
 Test level : 3V rms (unmodulated emf into 150 Ω)
 Modulation : 80%, 1kHz Amplitude Modulation.

8.6.1 E.U.T. Operation

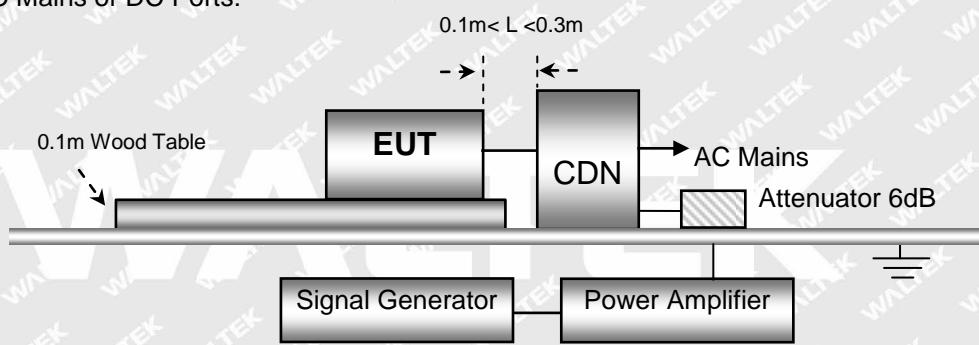
Operating Environment:

Temperature : 24.2°C
 Humidity : 42.4 % RH
 Barometric Pressure : 102.2kPa
 EUT Operation : Refer to section 6.5.

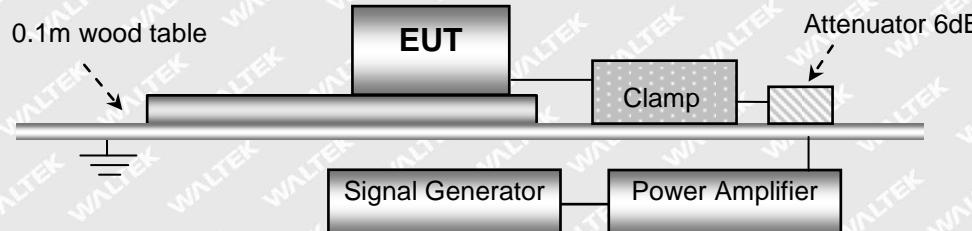
8.6.2 Block Diagram of Test Setup

The Injected Currents Immunity test was performed in accordance with the EN 61000-4-6.

For AC Mains or DC Ports:



For Signal, Telecommunication or Control Ports:



8.6.3 Test Results

Line	Frequency	Test Level	Voltage Level	Modulation	Step Size	Dwell Time	Performance Criteria	PER
AC Mains	0.15MHz to 80MHz	2	3Vrms	80%, 1kHz Amp. Mod.	1%	1s	A	0.000%



8.7 Voltage Dips and Interruptions

Test Method : EN 301 489-1, EN 61000-4-11
 No. of Dips / Interruptions : 3 per Level at 10ms intervals

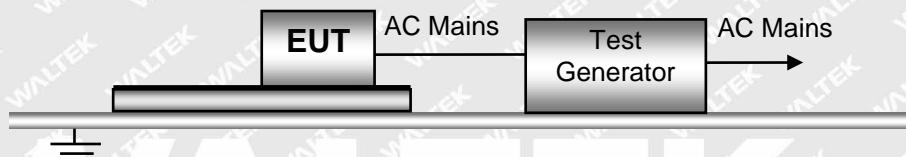
8.7.1 E.U.T. Operation

Operating Environment:

Temperature : 24.2°C
 Humidity : 47.2 % RH
 Barometric Pressure : 102.4kPa
 EUT Operation : Refer to section 6.5.

8.7.2 Block Diagram of Setup

The Voltage Dips and Interruptions Immunity test was performed in accordance with the EN 61000-4-11.



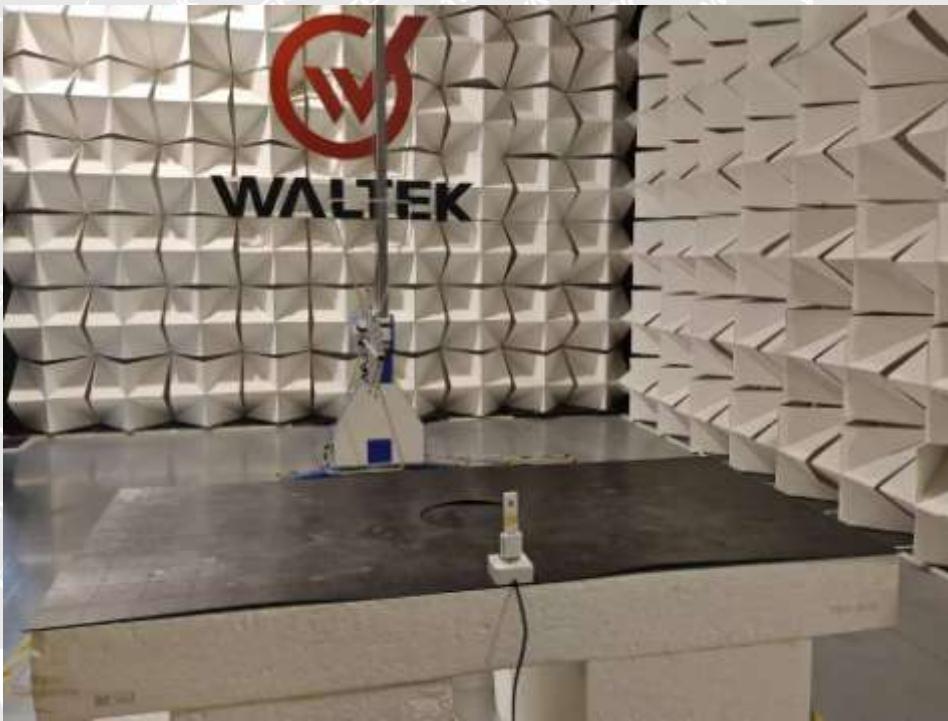
8.7.3 Test Results

Type	Residual Voltage (%)	Phase	Cycle	No of dropout	Performance Criteria
Voltage Dips	0	0°	0.5	3	B
	0	0°	1	3	B
	70	0°	25	3	C
Voltage Interruption	0	0°	250	3	C

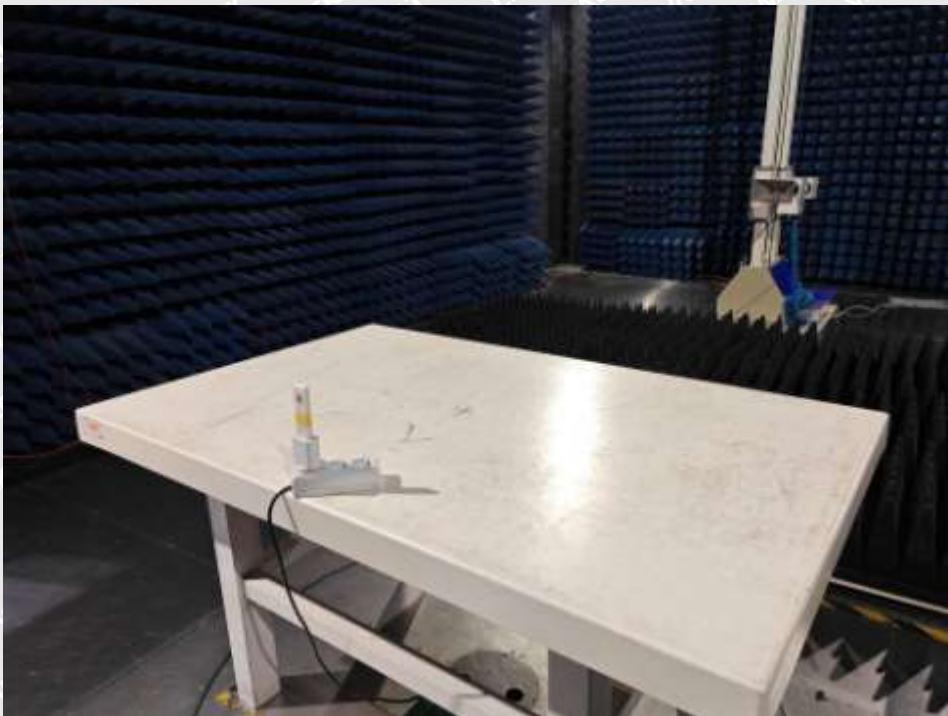
9 Photographs – Test Setup

9.1 Photograph - Radiated Emissions Test Setup

For 30MHz-1000MHz



For Above 1GHz



9.2 Photograph - Conducted Emissions Test Setup



9.3 Photograph - Radiated immunity Test Setup

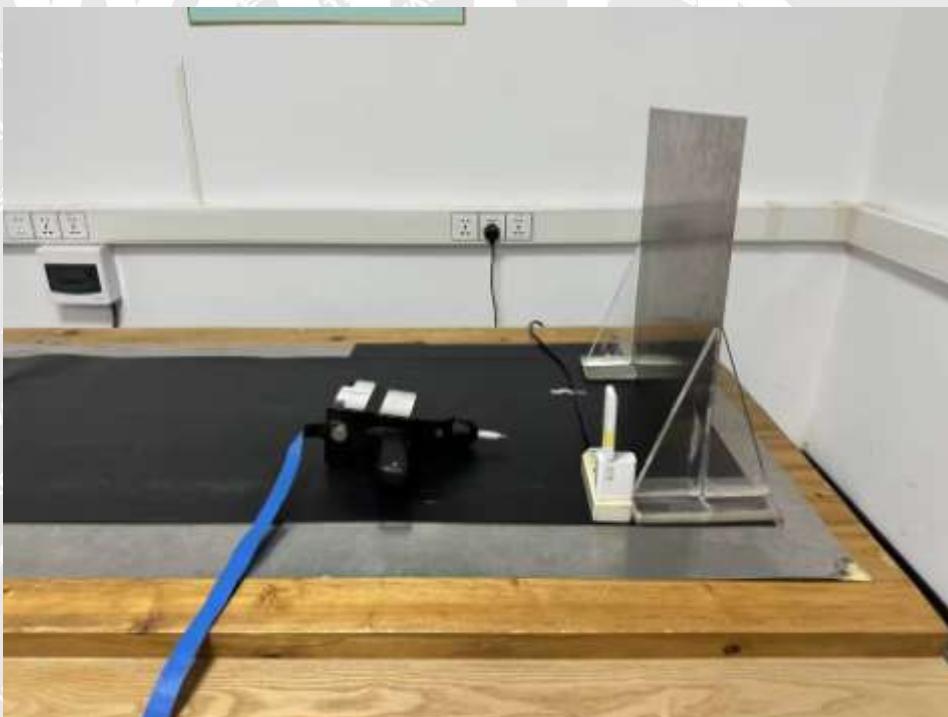
For below 1GHz



For above 1GHz

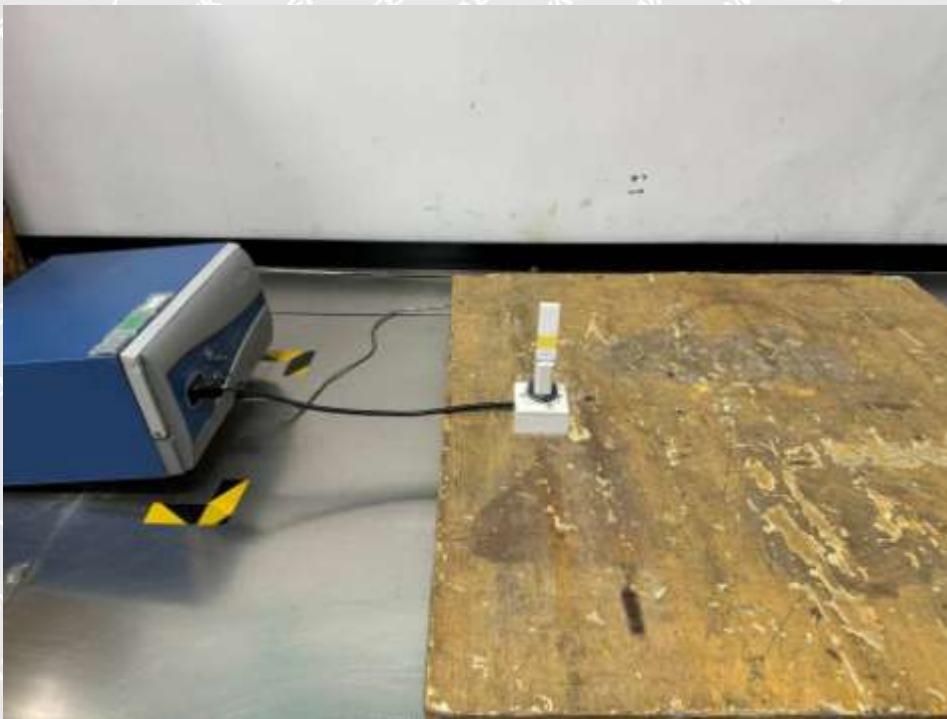


9.4 Photograph - ESD Test Setup

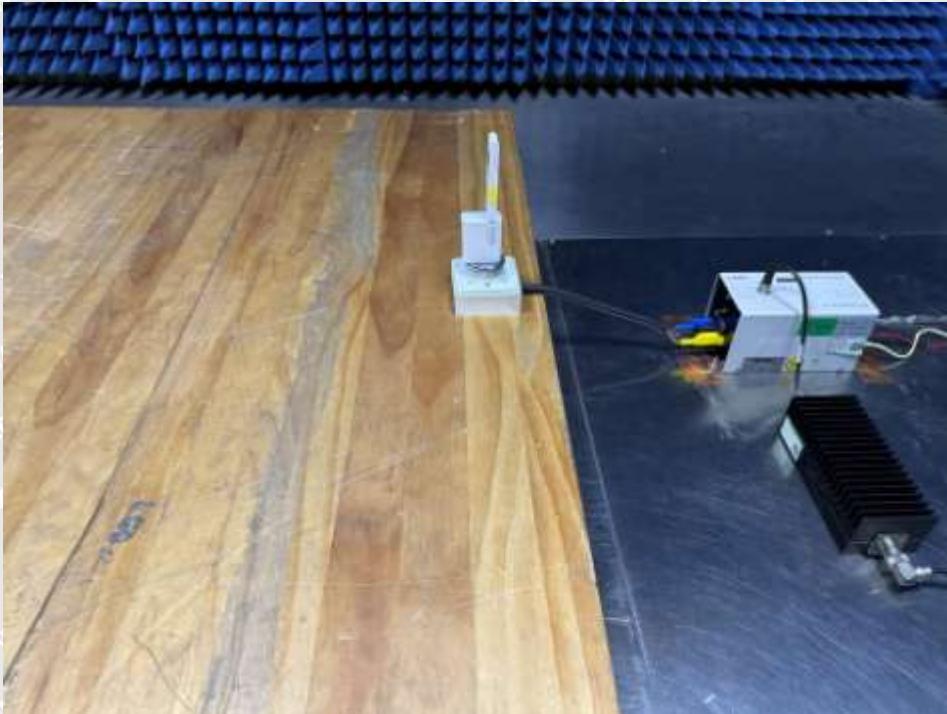




9.5 Photographs – Surge & EFT & Dips Test Setup



9.6 Photographs – Conducted Immunity Test Setup





10 Photographs of EUT

Note: Please refer to appendix: Appendix-HM-G02E-Photos.

=====End of Report=====

WALTEK